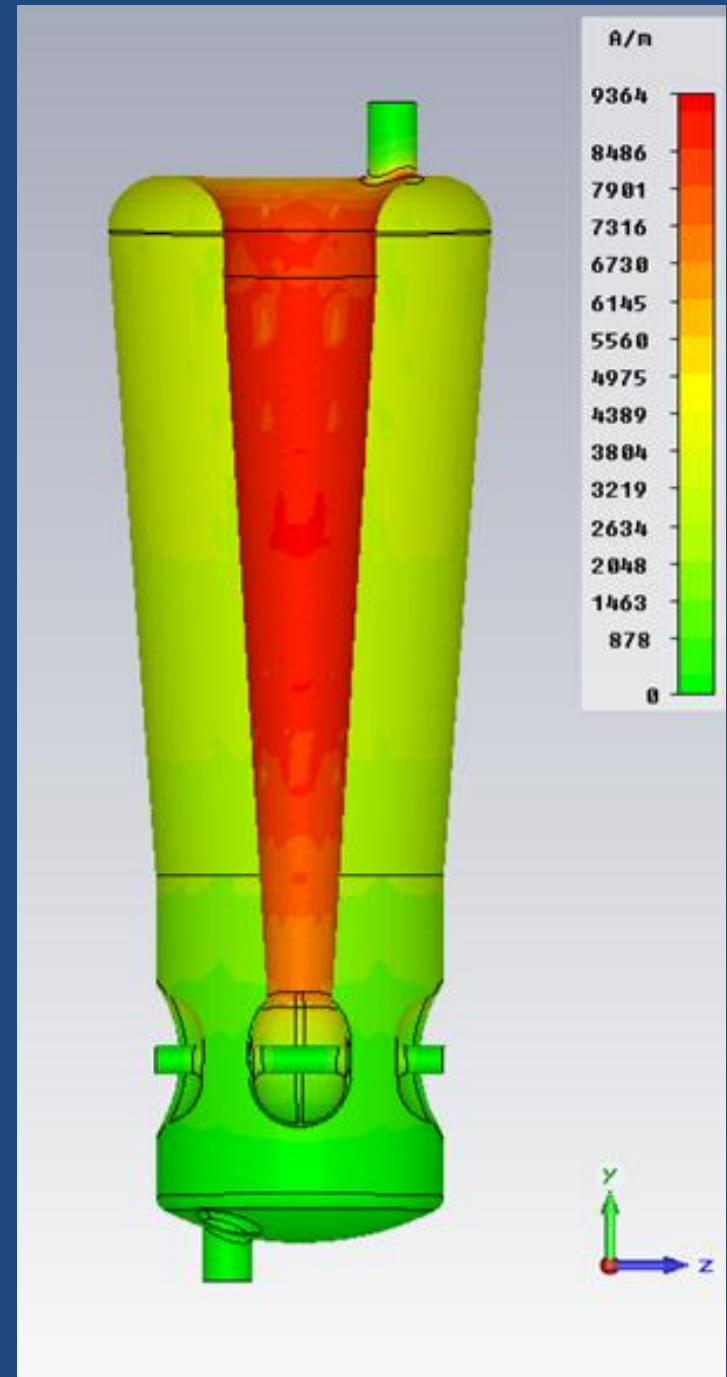


Using Second Sound to Locate a Defect in an Accelerating Cavity

Damien Denis

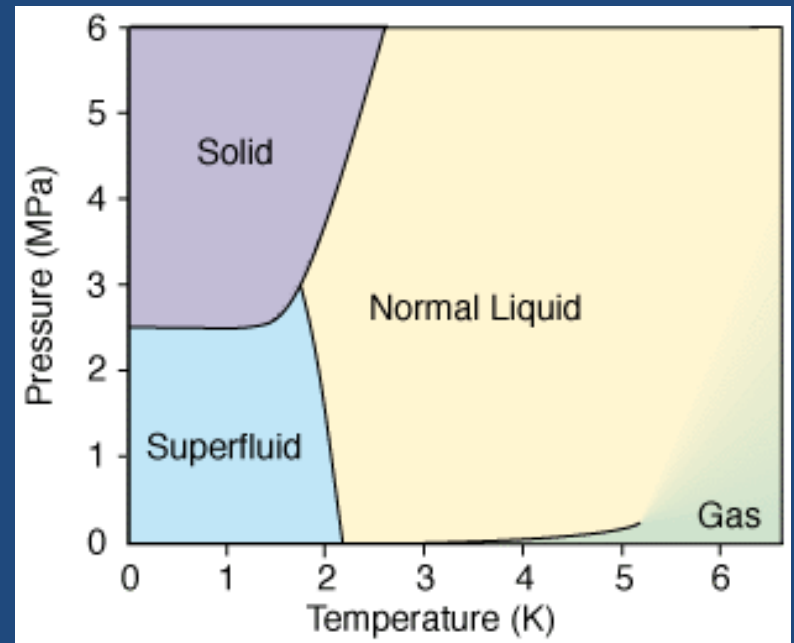
Why find defects?

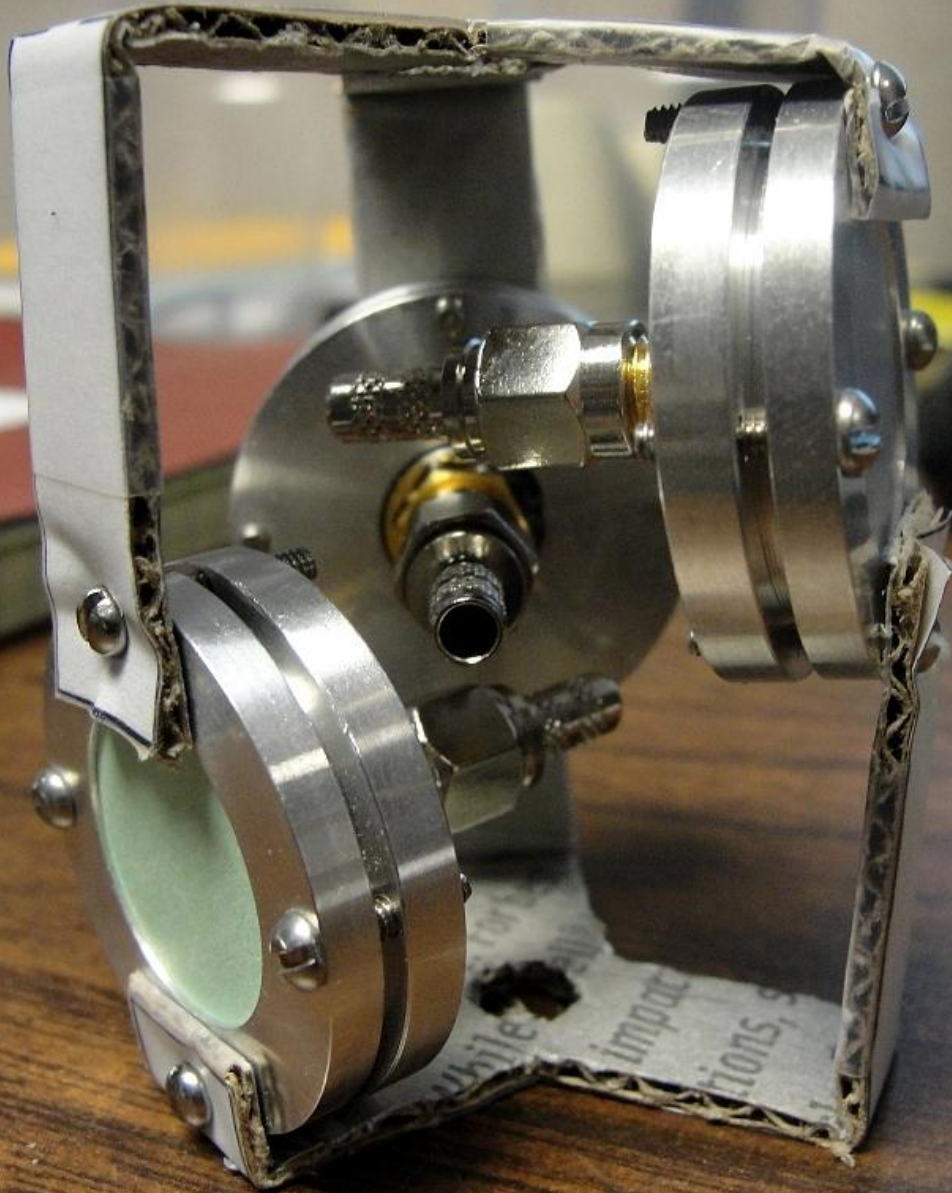
- Superconducting cavities are used to accelerate particles.
- A cavity defect may enhance local power losses, which may limit the accelerating gradient.
- Locating and mitigating defects are one way of improving the accelerating gradient.
- Cavities with a higher accelerating gradient = shorter, cheaper particle accelerators.



Second Sound

- Superfluid Helium has unique properties, some of which can help us find defects.
- 2nd sound = temperature–entropy waves
 - 1st sound = pressure–density waves
- Speed of 2nd sound < 1/10 speed of 1st sound
 - Allows for more accurate position readings.
- Detectors act like microphones to “listen” for the temperature–entropy waves.





What comes next?

- Test the system hypothetically.
- Work with machinist to build the parts.
- Assemble the device.